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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/321,518	05/27/1999	TERRY L. GILTON	6047-51973	6563

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EXAMINER	
LOUIE, WAI SING	
ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 02/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/321,518	GILTON ET AL.	
	Examiner	Art Unit	
	Wai-Sing Louie	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 January 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *39-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *39-56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 39-41, 43-48, and 50-56 are rejected under 35 U.S.C. 102(e) as being anticipated by McNeilly et al. (US 5,762,755).

With regard to claims 39-40, 43-44, 48, 50-52, and 55-56, McNeilly et al. disclose an apparatus for cleaning a semiconductor wafer (col. 3, line 24 to col. 14, line 38 and fig. 1) comprising:

- A chamber 2 sized to receive at least one wafer to be cleaned;
- A solvent applicator 59 coupled to the chamber and adapted to vaporize and apply a solvent to at least one of the first and second side surface of the wafer positioned within the chamber so as to form a film of liquid solvent on the at least one of the first and second wafer side surfaces. The liquid solvent applying to the at least one of the first and second wafer side surface is water, which is inert to the wafer (col. 4, lines 20-22);
- A temperature controller 31 positioned and operable to maintain the at least one wafer at a temperature lower than the temperature of the solvent and the solvent condenses on the wafer (col. 3, line 63 to col. 4, line 17);

- A gas source 25 of at least one reactive gas coupled to the chamber so as to deliver such gas to the chamber, the at least one reactive gas being selected to chemically react with the surface of the wafer to clean the wafer;
- The liquid solvent comprises a transport medium 29 which carries at least some of the at least one reactive gas through the film to the at least one of the first and second wafer side surfaces where the at least one reactive gas chemically reacts with the at least one of the first and second wafer side surfaces.

With regard to claim 41, McNeilly et al. disclose one reactant gas comprises ozone 25 as a major component and mixes the solvent comprises water 24 at pipe 18 (col. 10, lines 51-62).

With regard to claim 45, McNeilly et al. disclose a reactant gas incorporator adapted to introduce reactant gas into the liquid before the liquid layer is formed (col. 3, line 63 to col. 4, line 17).

With regard to claim 46, McNeilly et al. disclose an apparatus for stripping photoresist from semiconductor wafers comprising:

- A film former adapted to condense a solvent to form a film of liquid solvent onto a surface of the contaminated wafer, which is to be stripped of contaminant (photoresist) (col. 4, lines 23-27). McNeilly et al. disclose the first liquid solvent is water, which is non-chemically reactive with the photo-resist (col. 4, lines 20-22);

- A gas exposer adapted to expose the film of liquid solvent to a source of at least one reactant gas which is substantially non-chemically reactive with the solvent and which is chemically reactive with the contaminant (photoresist) so as to the strip the contaminant (photoresist) from the wafer surface (col. 5, line 62, to col. 6, line 32 and table 3);
- A cooling mechanism 31 operable to cool the surface of the wafer;
- A reactant gas 25 is transported through the film of liquid solvent to the wafer surface (fig. 1).

With regard to claims 47 and 54, McNeilly et al. disclose the concentration of dissolved gas in the solvent is 6.17% (col. 8, line 29).

With regard to claim 53, McNeilly et al. disclose the film of condensed liquid solvent has a thickness about 1 μm and about 3000 μm (see table 4 and 5).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 42 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over McNeilly et al. (US 5,762,755) and in view of McConnell et al (US 4,795,497), previously applied, and Bachman et al. (US 4,946,549), previously applied.

With regard to claim 42, in addition to the limitations disclosed in claim 39, McNeilly et al. also disclose:

- A wafer carrier 7 within the chamber;
- McNeilly et al. disclose a wafer carrier within the chamber, but do not disclose the substantially vertical position. However, McConnell et al. disclose a vertical wafer carrier (fig. 1). McConnell et al. teach the vertical wafer does not retain any residue of cleaning solvent to cross-contaminate the successive fluids (McConnell col. 4, lines 6-14). Hence, it would have been obvious to one with ordinary skill in the art to modify McNeilly's device with the teaching of McConnell et al. to have a vertical positioned wafer within the treatment chamber in order to drain the cleaning off the wafer surface.

With regard to claim 49, McNeilly et al. disclose using hydrofluoric acid to remove the contamination of the surface of the wafer, but do not disclose a perfluorocarbon solvent. However, Bachman et al. disclose the perfluorocarbon such as CF_4 and other poly-fluorocarbon material are used to remove silicon dioxide, Si_3N_4, photoresist, and polyimide from the silicon wafer (Bachman col. 2, line 59-67). Bachman et al. teach the perfluorocarbon solvent assists the reactive gases to remove the photoresist (Bachman col. 6, lines 30-38). Thus, it would have been obvious to one with

ordinary skill in the art to modify McNeilly's device with the teaching of Bachman et al. to use perfluorocarbon to remove the photoresist from the wafer.

Response to Arguments

Applicant's arguments filed 1/6/03 have been fully considered but they are not persuasive.

- Applicant argues the McNeilly et al. do not disclose or suggest (1) a liquid solvent layer on the wafer that serves as a transport medium for a reactive gas or (2) a liquid solvent layer that is inert to or non-chemically reactive with the surface of a wafer. However, these are process limitations, which do not carry any patentable weight in a device claim. McNeilly's device is capable of applying a layer of liquid solvent on the wafer. The liquid vapor from evaporator 59 could send to chamber 2 (fig. 4). Chamber 2 is equipped with cooling coil 31 circulated with cooling gas (col. 12, lines 1-10) and the liquid would be condensed on the chilled wafer. The liquid could be pure water, which is inert to the wafer.
- Applicant argues ozone in McNeilly is not present in the chamber when HF/H_2O is introduced into the chamber to etch the wafer. However, McNeilly's device is capable of applying ozone to chamber 2. The sequence of addition is a method step, which does not carry any patentable weight in a device claim.

- Applicant argues the liquid solvent in McNeilly is HF/H_2O, which is an etching agent. However, McNeilly's device is capable of adding only water in the evaporator 59. This meets the claim limitation.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (703) 305-0474. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for

the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

wsl
February 18, 2003

LONG PHAM
PRIMARY EXAMINER